Information Request JS-NSTAR-1-1

Please provide copies of (1) all prefiled testimony or reports (including all associated exhibits and attachments) submitted by Mr. Salamone to state and federal regulatory authorities from 1999 to the present; and (2) transcripts of Mr. Salamone's testimony at hearings (adjudicatory or non-adjudicatory) before state and federal regulatory authorities from 1999 to the present.

Response

Please see Attachment JS-NSTAR-1-1(a) and JS-NSTAR-1-1(b), which include the prefiled testimony for the following cases: (1) Cape Wind Associates, LLC and Commonwealth Electric Company d/b/a NSTAR Electric, EFSB 02-02/D.T.E. 02-53; and (2) Sithe Interconnection Agreement, FERC DOCKET NO. ER01-890-000.

# COMMONWEALTH OF MASSACHUSETTS

## DEPARTMENT OF TELECOMMUNICATIONS AND ENERGY
## and
## ENERGY FACILITIES SITING BOARD

## DIRECT TESTIMONY OF

## CHARLES P. SALAMONE

**Q. Please state your name, position and business address.**

A. My name is Charles P. Salamone. I am Director of System Planning for the electric subsidiaries of NSTAR, with an address of One NSTAR Way, Westwood, Massachusetts.

**Q. On whose behalf are you testifying?**

A. Commonwealth Electric Company d/b/a NSTAR Electric ("NSTAR Electric").

**Q. Please summarize your professional and educational background.**

A. I hold a Bachelor of Science Degree in Electrical Engineering from Gannon University. I joined the Engineering Department of Commonwealth Electric Company in July of 1973. At that time, I became a Junior Planning Engineer where my primary responsibilities were to assist in the planning, analysis and design of the transmission and distribution systems of the company. I generally followed the normal progression of positions with increasing levels of responsibility within the planning area until taking my current position in 2000. I have recently served as Chair of the NEPOOL Planning Policy Subcommittee (1997-1998), Chair of the NEPOOL Regional Transmission Planning Committee (1998-1999) and Vice Chair of the NEPOOL Reliability Committee (1999-2000). I am a Registered Professional Engineer with the Commonwealth of

Massachusetts. I am also a member of the Power Engineering Society of the Institute of Electrical and Electronic Engineers.

A copy of my resume is attached hereto as Attachment A.

**Q. Have you previously testified before any regulatory agency?**

A. Yes. I have previously testified before the Federal Energy Regulatory Commission, the Department of Telecommunications and Energy and the Energy Facilities Siting Board on a number of technical matters relating to system planning.

**Q. What is your involvement and responsibility with respect to the electric transmission line project which is the subject of this proceeding?**

A. I am responsible for the transmission system planning studies that are being performed with respect to the interconnection of the proposed facilities with the transmission system of NSTAR Electric. In conjunction with other witnesses, I am responsible for the design of the new transmission lines and any upgrades to other transmission facilities on the transmission system of NSTAR Electric necessary to effectuate the interconnection.

**Q. What parts of the Petition are you responsible for?**

A. In conjunction with other witnesses, I am responsible for Section 4.5.3, *Costs of Facilities*; Section 4.5.4, *Reliability*; Section 5.3, *Cost of the Proposed Project Along the Preferred and Alternative Routes*; and Section 5.4, *Reliability of the Proposed Project Along the Preferred and Alternative Routes*.

**Q. Are there any revisions, updates or corrections to those matters for which you are responsible?**

A. Not at this time.

**Q. Does this complete your testimony?**

A. Yes, it does.

**Charles P. Salamone**
23 Westerly Drive
Bourne, MA, 02532
(508) 759-3489

## PROFESSIONAL SUMMARY

***Professional Engineer*** with supervisory and leadership skills and experience in:

| | |
|---|---|
| Engineering Staff Supervision | New England Power Pool |
| Transmission Planning | Substation Planning |
| Distribution Planning | Meter Engineering |
| Budget Management | Specification Development |
| Regulatory Agency Testimony | Software Development |
| Computer Based Analysis | Data Processing |
| Congestion Management | Generator Interconnections |

## EMPLOYMENT BACKGROUND

***Director System Planning*** 2000-Present
NSTAR (Previously Boston Edison and Commonwealth Electric) Boston, MA

- Responsible for long term planning of Company transmission, substation and distribution systems
- Supervise a staff of 9 professional engineers
- Oversee transmission and distribution planning efforts to establish a comprehensive 10 year $300 million system expansion plan
- Serve as Company representative on NEPOOL Reliability Committee and the New England Transmission Expansion Advisory Committee

***Manager, System Planning and Meter Services*** 1989-1999
Commonwealth Electric Company, Wareham, MA

- Develop risk based prioritized $10 million construction budget procedures
- Supervise a staff of 6 professional engineers and 4 analysts
- Served as chair of the NEPOOL Regional Transmission Planning Committee
- Process billing determinant and interval data for all major system customers
- Develop annual performance analysis reports for all transmission and major distribution systems
- Manage multiple FERC tariff based transmission customer and generation developer system impact studies
- Serve as expert Company witness in State and FERC regulatory proceedings
- Initiated implementation of a risk index for prioritization of all transmission and major distribution construction projects
- Initiated implementation of automated electronic processing of major customer billing data, which significantly reduced time needed to generate bills .

- Served as lead member on information technology company merger team
- Implemented process and equipment to perform all tie line, generator and wholesale customer meter testing
- Served as chair of the NEPOOL Planning Process Subcommittee, which established numerous NEPOOL policies for transmission and generator owners
- Served as Vice-Chair of the NEPOOL Reliability Committee

***Meter Engineer*** 1984-1989
Commonwealth Electric Company, Plymouth, MA

- Designed and supervised installation of 15 generator metering and data recorders
- Developed customer load plotting and analysis software
- Developed meter equipment order data processing system for four remote offices
- Implemented PC control of meter test boards, which significantly reduced processing and record keeping time
- Managed programming of all electronic meter registers to insure accurate data registration

***Computer Application Engineer*** 1979-1984
Commonwealth Electric Company, Wareham, MA

- Implemented numerous technical and analytical software applications for engineering analysis
- Served as member of decision team for implementation of a new SCADA system

***Planning Engineer*** 1978-1979
San Diego Gas & Electric Company, San Diego, CA

- Performed extensive stability analysis for a new 230 kV transmission interconnection with Mexico
- Performed transmission design and performance analysis for a new 250 mile 500 kV line from San Diego to Arizona

***Planning Engineer*** 1973-1978
New England Gas & Electric Company, Cambridge, MA

- Performed extensive stability analysis for a new 560 MW generating plant on Cape Cod
- Developed transmission plan for a new 345 kV transmission line on Cape Cod
- Developed plans for design and sighting of new 115 / 23 kV substations on Cape Cod

## EDUCATION

Massachusetts Professional Engineer License #36499, 1992

B.S.E.E, Power System Engineering, 1973
Gannon University, Erie, PA

EXHIBIT NO. BE-3

# PREPARED
# DIRECT TESTIMONY

of

CHARLES P. SALAMONE

APRIL 19, 2001

EXHIBIT NO. BE-3

BOSTON EDISON COMPANY
FEDERAL ENERGY REGULATORY COMMISSION
DOCKET NO. ER01-890-000

SUMMARY OF THE PREPARED DIRECT TESTIMONY OF
CHARLES P. SALAMONE

The purpose of Mr. Salamone's testimony will be to first describe generally the characteristics of the BECO transmission system that serves the Boston area. Second, he describes the relationship of BECO's system to the NEPOOL Control Area and to the independent system operator for New England ("ISO" or "ISO-NE"). Third, he describes Sithe's existing generating facilities in the Boston area as well as Sithe's new Mystic generation plant that Sithe has requested BECO to interconnect with BECO's transmission system. Fourth, he describes, from an engineering standpoint, the new transmission facilities and upgrades that are necessary for interconnection of the new Sithe Mystic generators to the BECO transmission system, along with the impact on BECO's ability to serve load in the area from external versus internal resources. Fifth, he explains how planned outages of transmission lines necessary for construction of the facilities associated with the interconnection of Sithe's new generation at Mystic will further constrain BECO's transmission system, and potentially result in significant additional energy redispatch costs paid by consumers within New England. Finally, he shows that these increased redispatch costs can be identified as being caused by the outages necessary to interconnect Sithe, and shows how to calculate and track these incremental cost impacts, so they can be assigned to Sithe.

BOSTON EDISON COMAPNY
FEDERAL ENERGY REGULATORY COMMISSION
DOCKET NO. ER01-890-000

DIRECT TESTIMONY

of

CHARLES P. SALAMONE

Q. Please state your name and business address.

A. My name is Charles P. Salamone. My business address is 151 University Avenue, Westwood, Massachusetts 02090.

Q. By whom are you employed and in what capacity?

A. I am Manager of System Planning for the electric subsidiaries of NSTAR. These companies include Boston Edison Company ("BECO" or "Company"), Cambridge Electric Light Company, and Commonwealth Electric Company.

Q. Please describe your education and professional background.

A. I graduated from Gannon University in 1973 with a Bachelor of Science Degree in Electrical Engineering. Upon graduation I joined the Engineering Department of Commonwealth Electric Company in July of 1973. At that time I became a Junior Planning Engineer with Commonwealth Electric Company where my primary responsibilities were to assist in the planning, analysis and design of the transmission and distribution systems of the company. I generally followed the normal progression of positions with increasing levels of responsibility within the planning area until taking my current position in May of 1989. I have recently served as Chair of the NEPOOL Planning Policy Subcommittee (1997-1998), Chair of the NEPOOL Regional Transmission Planning Committee (1998-1999) and Vice Chair of the NEPOOL Reliability Committee (1999-

2000).

Q. Do you hold positions in professional or business associations?

A. Yes. I am a Registered Professional Engineer with the state of Massachusetts. I am also a member of the Power Engineering Society of the Institute of Electrical and Electronic Engineers.

Q. Please describe your present responsibilities with NSTAR.

A. As Manager of Transmission Planning, I am responsible for directing the planning, analysis and design of the transmission and major distribution systems of NSTAR. This responsibility consists of reviewing the operation and reliability of the existing and planned transmission and distribution systems for their ability to serve area customer load, deliver generator unit output and interface with the New England transmission grid.

Q. Have you previously testified in any formal hearings before regulatory bodies?

A. Yes, I have provided testimony in support of Cambridge Electric Light Company and Commonwealth Electric Company in FERC hearings in Docket Nos. ER94-1409-000, EL96-49-000 and EC98-50-000 and served as a company witness on a number of technical matters in state regulatory proceedings.

PURPOSE OF TESTIMONY

Q. What is the purpose of your testimony?

A. The purpose of my testimony will be to describe generally the characteristics of the BECO transmission system that serves the Boston area in terms of area loads, resources and transmission import capabilities. Second, I will describe the relationship of BECO's system to the NEPOOL Control Area and to the independent system operator for New England ("ISO" or "ISO-NE").

Third, I will describe Sithe Mystic Development, L.L.C.'s (Sithe) existing generating facilities in the Boston area as well as Sithe's new Mystic generation plant that Sithe has requested BECO to interconnect with BECO's transmission system. Fourth, I will describe, from an engineering standpoint, transmission upgrades and new facilities necessary for interconnection of the Sithe Mystic generators to the BECO transmission system along with the impact on BECO's ability to serve load in the area from external versus internal resources. Fifth, I will explain how planned outages of transmission lines necessary for construction of the facilities associated with the interconnection of Sithe's new generation at Mystic will further constrain BECO's transmission system, and result in significant additional energy redispatch costs paid by consumers within the Boston load area. Finally, I show that these increased redispatch costs can be identified as being caused by the outages necessary to interconnect Sithe, and show how to calculate and track these incremental cost impacts, so they can be assigned to Sithe.

<u>DESCRIPTION OF THE BECO SYSTEM</u>

Q. Please describe the BECO system as it exists today.

A. First, I note that my description is limited to BECO's facilities at the 115 kV level and above, because it is these larger facilities that are impacted by the Sithe interconnection.

Q. Do you have a diagram of the BECO system which may help describe the system?

A. Yes. Included as part of my testimony, as Exhibit No. BE-4, is a copy of the BECO 115/230/345 kV System Switching Plan ("Switching Plan"). I have also included Exhibit No. BE-5, which is a copy of the BECO 115/230/345 kV System Geographic Loads and Resources Diagram ("Resource Diagram").

Q. What does the Switching Plan show?

A. The Switching Plan shows the configuration of the BECO system, at the 115 kV, 230 kV and 345 kV level, as it exists today. It shows all of the internal generating stations, transmission lines and substations owned by BECO, and their corresponding element identifiers. It also shows additional details, such as breaker arrangements, metering points and tie points to neighboring transmission systems. See the legend in the lower right corner of the diagram for symbol descriptions.

Q. What does the Resource Diagram show?

A. The Resource Diagram shows the geographic region surrounding the Boston area. The diagram identifies the major transmission lines and major generating plants within the area that provides electric service to customers in and around the city of Boston. The 115 kV (Green lines), 230 kV(Blue lines) and 345 kV (Red lines) transmission lines shown in the diagram supply substations that serve customer loads within the area. The source of power to supply substations in the area come from generating units located both outside the area and inside the area. The major generating units inside the area are shown on the diagram.

Q. Is there anything unique about the Boston area with respect to its "electrical typography?"

A. Yes. First, I note that "electrical topography" can be defined as the electric system network that interconnects generating sources with electrical loads within a specific defined region. The Boston area's electrical topography is unique in that it is located in a "load pocket." A utility's "load" is the demand imposed on the utility by the requirements of its customers. A "load pocket" may be defined as an area of customer load that is circumscribed by a limited set of supply lines. One major constraining factor in the Boston load pocket is its coastal location. Unlike many other areas, the Boston area cannot import power from all points east, west, south or north, due to the Atlantic Ocean on the east.

Q. Please provide a geographic description of the Boston area transmission system.

A. A geographic description of the Boston area transmission system begins with 345 kV transmission lines originating from the north west at the Tewksbury 345 kV station, and connecting to Woburn, North Cambridge, Mystic and Golden Hills stations in a loop fashion. Lexington station and Kingston Street station connect to that loop in a radial fashion. The downtown Boston area, which is a subset of the greater Boston area, is functionally supplied in a radial fashion by Kingston Street station via four 115 kV lines and Mystic station via two 115 kV lines. New Boston station is the only generating station located in the downtown Boston load pocket. 230 kV transmission lines originate from the south west at the West Medway 345/230 kV station. Framingham station and Waltham station connect to West Medway station in a radial fashion. The Boston area 345 kV sub-system and the 230 kV sub-system are bridged by the 115 kV transmission network. Current flows on the 115 kV network are controlled by two sets of 115 kV phase angle regulators, also called phase shifters, located at Waltham and Baker Street.

Q. Do you have any observations about the transmission supply into the Boston area?

A. Yes. Three major points can be made about the transmission supply into the Boston area: 1) The Boston area does not have a true 345 kV and 230 kV bulk power network; 2) The 345 kV and 230 kV sub-systems extend only partially into the Boston area transmission system and, for all intents and purposes, can be described as radial supplies into the Boston load pocket; and 3) Line outages located near the Tewksbury 345 kV station or the West Medway 345/230 kV station can significantly reduce the Boston Import capability.

Q. Please describe the resources, capabilities, and capacities available to the BECO system for providing service to customers in the Boston area.

A. The ability to supply load in the Boston area load pocket is dependent upon both internal and external resources and relies on both local and remote generating resources. Load within the Boston load pocket includes customers served by Boston Edison, National Grid and various other municipal electric entities. The load pocket described here is defined by the Boston Interface and is based on the lines that are monitored by the ISO for dispatching resources within the area. The highest customer load recently seen by Boston Edison was 3098 MW occurring in July of 1999. The other loads in the area add an approximate additional 1000 MW of load that must be served by the transmission and generation resources in the area. The major generating plants in the area include generating facilities located at New Boston Station, Mystic Station, and Salem Harbor Station. The summer maximum capacity of these plants is 760 MW, 970 MW and 743 MW, respectively. There are a number of small generating units in the area that provides an additional 400 MW of capacity with an average unit size of 22 MW. There are 12 major 115 kV, 230 kV and 345 kV transmission lines that supply the area and collectively they can support up to approximately 3000 MW of area load. To summarize these values, there is approximately 4100 MW of customer load. This load can be supplied by 2873 MW of local generation and 3000 MW of remote generation via area transmission facilities. As the values indicate, both local generation and remote generation must serve customer loads since neither resource is sufficient in and of itself to supply all of the area load.

Q. Has BECO's system changed from the system it operated prior to efforts in the 1990's to deregulate the provision of electric service?

A. Yes. In 1997 Massachusetts required utilities such as BECO to divest themselves of all owned generation. In furtherance of these deregulation efforts, BECO sold to Sithe affiliates the following generation plants that served BECO's load: New Boston Station, Mystic Station, Edgar Station, and various smaller generating units located in the Boston area. The ultimate impact of the deregulation effort was that BECO no longer owned most of the local generation facilities used to meet its load. Currently, BECO purchases 100% of its load requirements from other generators in the New England area.

RELATIONSHIP OF BECO TO NEPOOL AND ISO-NE

Q. Please describe the structure and responsibilities of NEPOOL.

A. The New England Power Pool ("NEPOOL") Control Area is a power pool in New England involving a number of electric system facilities that are interconnected and operated on a coordinated basis to achieve economies in generating energy, transmitting power and supplying the combined New England load. NEPOOL's specific responsibilities are to "perform the functions of a regional transmission group by ... providing for the activation of the ISO and the execution of a contract between the ISO and NEPOOL to define the ISO's responsibilities." The objectives of NEPOOL are "to assure that the bulk power supply of the NEPOOL Control Area conforms to proper standards of reliability ...(and) to attain maximum practicable economy, consistent with proper standards of reliability and the maintenance of competitive markets, in such bulk power supply." (NEPOOL RESTATED AGREEMENT)

Q. Please describe the structure and responsibilities of ISO-NE.

A. ISO-NE is the independent system operator for the NEPOOL Control Area. It is responsible for the short-term reliability of the New England region power system and administers the wholesale markets in New England. ISO's specific responsibilities are to "provide direction and control of the operation of the bulk power system consistent with proper standards of reliability, administration of NEPOOL's open-access transmission tariff and administration of a power exchange, consistent with the requirements of the Federal Energy Regulatory Commission." (Interim Independent System Operator Agreement, July 1997).

Q. Please describe the relationship of BECO to NEPOOL and ISO-NE.

A. As a transmission service provider in New England, BECO is a Participant in the NEPOOL Agreement which obligates it to operate, maintain and construct its facilities in a manor consistent with the objectives, rules and procedures established by NEPOOL and implemented by ISO-NE through its direction and control of the bulk power system.

DISPATCH OF GENERATORS BY ISO, CONSTRAINED GENERATION AND OPERATION OF GENERATION OUT OF MERIT

Q. Please describe how ISO-NE determines which generators will be dispatched to meet projected customer loads under a bid-based system.

A. First, I note that "dispatch" in the context used here means to call for a generating unit to produce a specified energy output over a defined time period consistent with the physical capabilities of the equipment and requirements for its operation. ISO-NE will determine which generators will be dispatched to meet projected customer needs under a bid-based system, by incrementally adding the lowest bid-priced generating units to the cumulative system energy output, until the projected need for supplying all energy requirements that it is responsible for within New England are met. All the units identified in this process are considered to be "economically" dispatched. The last unit to be selected will set the "market clearing" price for energy for that particular period for New England.

Q. Please describe how the dispatch is adjusted based on transmission capacity constraints under such a system.

A. The dispatch of generating units determined from the bid-based process must be adjusted to take into account the limitations of the transmission system. These limitations result in two types of constraints. The first type requires reducing generation within an area that has an aggregate generator output that exceeds the local area load by an amount that exceeds the limitations of the transmission system to transport power out of the area. This is known as "constrained off" generation. The second type requires increasing generation within an area where all of the dispatched energy cannot be delivered into the area due to limitations of the transmission system to transport power from outside the area. This is known as "constrained on" generation. When the system operator is required to change its dispatch queue to account for transmission limitation, units that are constrained on or constrained off are said to be "redispatched."

Q. How does the transmission system capacity within the Boston area play a role in determining the cost of energy for service to customers?

A. Since the transmission capacity serving the Boston area cannot support all loads within the area, as previously noted, generation must be constrained on to meet the area's energy requirements. When constrained on units are offering bid prices that exceed the most expensive economically dispatched unit, they are considered as running "out-of-merit," since their dispatch will require running more expensive generation then would otherwise be required. This results in increasing the cost of energy by an amount equal to (a) the difference in price between the market price and the price of the constrained on unit, (b) multiplied by the amount of energy that the constrained on unit must provide. This results in a higher energy cost for service to customers.

<u>EXISTING CONGESTION COST PROBLEMS IN NEPOOL</u>

Q. Are there currently problems in NEPOOL concerning congestion costs?

A. Yes, there are. NEPOOL currently experiences significant congestion cost problems and that situation is projected to continue into the future. "Congestion" is commonly defined as the cost associated with dispatching generating units out-of-merit when demands for transmission exceed the thermal limits of an interface.

Q. Please describe the cause of existing congestion costs in NEPOOL.

A. The cause of existing congestion costs in NEPOOL is due to constraints within the transmission system that prohibit the ability to run all economically dispatched units. These limitations can require more expensive units to run or may not allow lower cost units to run because the transmission system cannot support the loading conditions that would result by dispatching or not dispatching units within an area.

Q. Please describe the level of existing congestion costs in NEPOOL.

A. The level of congestion costs in NEPOOL has dramatically increased in recent years. NEPOOL congestion costs have gone from nearly zero in August of 1999, to nearly $20 million in the month of December, 2000. In this regard, my Exhibit No. BE-6 is a chart showing from May 1999 until May 2000 that bid prices have gone up substantially during periods of congestion. From this significant increase in bid prices, I conclude that congestion costs will continue to grow particularly as load grows, and dependency on internal generation continues to increase.

<u>EXISTING SITHE GENERATING FACILITIES</u>

Q. Please describe the existing generating facilities owned by Sithe or its affiliates in the Northeastern Massachusetts Area ("NEMA").

A. The existing generating facilities owned by Sithe or its affiliates in NEMA include the following generating plants: New Boston Station, Mystic Station and various smaller generating units at Framingham Station and Medway Station. The two large plants, New Boston and Mystic, can generate about 1730 MW. As more fully discussed by Mr. Clarke in his testimony, Sithe and its affiliates own about 60% of the generating capacity in NEMA, prior to completion of the Sithe Mystic facility. That percentage, after the Mystic plant is completed and connected, could go up to over 70% if no units are retired, and will be approximately 63% if the logical units are retired.

The interconnection design of the new generating units does not allow for concurrent operation of some of the existing units owned by Sithe. Specifically, with the 1600 MW of new generation running, the Mystic 4, 5, and 6 units and the New Boston 1 and 2 units cannot be dispatched. This results in a net increase in area generation output of 460 MW and the associated increase in total local area generation ownership by Sithe and its affiliates.

INTERCONNECTION OF SITHE GENERATION AT MYSTIC STATION

Q. Please describe the electrical interconnection of Sithe's new generating plant at Mystic Station.

A. The new generating plant at Mystic Station will require connection of one 800 MW generation block (one steam unit and two gas units) to the 345 kV ring bus at the station and the other 800 MW generation block (one steam unit and two gas units) to both an existing and a new 115 kV ring bus. The existing 115 kV and 345 kV ring busses are currently connected through a single 115 kV to 345 kV autotransformer. The interconnection, in addition to requiring numerous transmission line upgrades, requires splitting the existing 115 kV ring bus into two separate and normally unconnected ring busses. One of the 115 kV ring busses will be connected to the 345 kV ring at Mystic and to the two combustion turbine generators of one of the 800 MW block of units. The other 115 kV ring bus, in addition to connecting to the steam unit of the same 800 MW block of units, will be connected to three other 115 kV transmission lines.

Q. Does BECO follow any NEPOOL procedures in its planning for the interconnection of the new Sithe Mystic generation?

A. Yes. In planning for the interconnection of Sithe's new generation at Mystic, BECO follows the "Minimum Interconnection Standard" (MIS) implemented by NEPOOL. The MIS is set forth in NEPOOL Planning Procedure No. 5-6, which is attached as Exhibit No. BE-7

Q. Please explain the MIS.

A. The MIS implemented by NEPOOL requires that all generating units wishing to interconnect to the New England Transmission system to do so in a manner that does not violate the NEPOOL Reliability Standard and does not cause a reduction in the transfer capability of any transmission line or interface. This often requires that new transmission facilities and/or upgrades to existing transmission facilities be constructed before a new unit can be connected to the system.

Q. Have you prepared any diagrams to help explain the transmission work schedule and transmission system impacts?

A. Yes. Exhibit No. BE-8 is a transmission work schedule diagram and Exhibit No. BE-9 is a transmission impact diagram, both of which were prepared under my supervision and direction.

Q. What does the transmission work schedule diagram show?

A. Exhibit No. BE-8 shows the schedule and duration of major work tasks and the expected equipment outages that are required for completion of the work itemized below.

Q. What does the transmission impact diagram show?

A. Exhibit No. BE-9 shows where work on the BECO transmission system must be completed and where transmission equipment must be taken out of service to allow for performance of such work.

Q. Please describe the new transmission facilities and the upgrades to existing facilities that are necessary to interconnect the generation from the Sithe Mystic plant to BECO's transmission system.

A. The interconnection of the new generating plant at Mystic Station involves a significant number of new transmission facilities and upgrades to existing facilities in order to mitigate potential thermal overloads, voltage and short circuit impacts. These include the following new facilities or upgrades:

- Split line 346XY (North Cambridge – Woburn 345 kV) into two separate lines, 346 and 365.
- Install a 345 kV line parallel to line 358 (Mystic – North Cambridge 345 kV), to be named 351.
- Install an 80 MVAr 115 kV shunt reactor to compensate the additional cable charging from line 351.
- Split the Mystic 115 kV station so that the steam unit, lines 211-514, 423-515 and 488-518 connect to a new ring bus, which is isolated from the old ring by a normally open breaker. This breaker can only be closed when there are no short circuit or thermal concerns. These three lines extend from Mystic 115 kV to Woburn, Everett and Chelsea, respectively.
- Install a Type III SPS (special protection system) to trip the 115 kV steam unit for a stuck breaker contingency on the new bus to prevent STE (short term emergency) rating violations on lines 423-515 and 488-518. This SPS will trigger immediately on detection of a stuck breaker condition.
- Install a permanently connected 2.75-ohm series reactor on line 211-514.
- Reconductor 115 kV lines 250-516 and 250-517 between Mystic and Hawkins Street
- Improve cable cooling on lines 329-510 and 329-511 from Mystic to Somerville to Brighton in order to maintain ratings near their present values.
- Improve cable cooling on lines 385-510 and 385-511 between Kingston Street and High Street.
- Increase the rating of lines 324 and 372 between Kingston Street and Mystic.
- Replace the Mystic autotransformer to achieve Normal/LTE/STE cyclic ratings of approximately 360/420/550 MVA

- Install a 345 kV breaker adjacent to each of breakers 101, 106 and 107 at Mystic Station

Q. What process and schedule are necessary to complete installation of the new transmission system facilities and upgrades to existing facilities that are needed to interconnect the new generation from the Sithe Mystic plant?

A. The process for completing the necessary work first requires the identification of facilities that must be taken out of service so that the work may proceed. This is followed by assessing the impact the outages will have on the ability to serve load. Based on this impact assessment, a determination will be made concerning when the facility can safely be taken out of service, without jeopardizing the reliability of service to customers. The outage will then be scheduled to avoid conflicting with other required outages. An overall schedule is then developed, as shown in Exhibit No. BE-8. The scheduled outages are proposed to ISO-NE from one week to one month in advance of the requested outage date for their review and approval. ISO-NE will then conduct a more extensive system impact assessment of the requested outage and will either approve the schedule or request that a change in schedule be developed. ISO-NE typically employs all available resources to allow the request to be scheduled, including the running of any area generation necessary to insure reliable operation of the system.

<u>ECONOMIC IMPACT OF SITHE INTERCONNECTION</u>

Q. Please describe the economic impact this necessary work will have on BECO's transmission system and the generating resources in the Boston area.

A. The economic impact on the BECO transmission system is extraordinary. There are over a dozen outages that must be coordinated. These outages must be carefully planned to: (1) avoid conflicting with each other; (2) assure continued reliability of service to load; (3) ascertain the availability of generating resources; and (4) assure that required work is performed to meet the project completion date. The majority of this work must be performed over the Spring and Fall periods of 2001. It is only during these low demand periods that the outages can be undertaken without jeopardizing service to customers. These outages will, in a number of cases, also require that additional generation be dispatched in the area to avoid potential overloads of the remaining transmission facilities. A number of the outages will require that the New Boston or existing Mystic generating units be dispatched. These units are almost never included in the system economic dispatch because they are rarely bid at a level that would include them in the economic dispatch under these load conditions. Nor would they normally be constrained on due to existing transmission system limitations. Consequently, these units would be dispatched for the sole purpose of preserving reliability of service to customers while we complete necessary work on the transmission system in support of the new Mystic generators.

Q. What options does BECO have to attempt to mitigate (*i.e.* – reduce) these impacts?

A. BECO exercises every available resource and option in its efforts to minimize the need to run generation for the sole purpose of supporting the system during planned transmission outages. These efforts include: (a) consideration of numerous schedule modifications, including adjustments to the outage period and duration, through work schedule and work crew adjustments; and (b) detailed review of equipment ratings, with recalculations to reflect (i) the maximum allowable equipment loading for the given load level, and (ii) weather conditions expected during the outage. BECO also consults routinely with ISO-NE to determine what the potential economic impacts would be due to their projected requirements for running generation out of merit. All of this information is then used in our attempts to minimize economic impacts and the associated cost consequences.

Q. What can be concluded from these economic impacts?

A. First, despite BECO's best efforts, economic impacts due to the interconnection of Sithe's new Mystic generation is unavoidable. Second, there is no means by which the higher cost of running more expensive generation during necessary outages can be avoided, given the limited time periods for performing and completing the extraordinary amount of work required. These facts, in conjunction with the operating characteristics that call for extended run time durations (in some cases up to 5 days long), relatively high low operating limits and up 48 hour prior notice requirements of the units involved, will clearly lead to a significantly higher cost of energy. This is an unavoidable consequence of having to schedule all the facilities outages required to complete the necessary work to interconnect the Sithe's new generation at Mystic.

<u>DETERMINATION OF ASSOCIATED INCREMENTAL ENERGY COSTS FROM SITHE INTERCONNECTION</u>

Q. Please describe how ISO-NE would dispatch the system during the planned transmission system outages

A. ISO-NE utilizes a process that, as described earlier, begins with an economic dispatch of the system based on generator bids. The economic dispatch is adjusted to meet transmission system constraints and units are either constrained on or constrained off the system. Absent any proposed planned outages this would be the end of the dispatch scheduling process. Planned outages require ISO-NE to complete an additional evaluation of the system to determine if any additional units would be constrained on or off due to the unavailability of transmission facilities. This second evaluation would result in the ISO making the necessary adjustments to the transmission system limitations, and the ISO would then identify additional adjustments to the dispatch that are required to preserve system reliability.

Q. Please describe how energy costs are currently determined for serving customers in the Boston area.

A. The cost of energy for service to customers in the Boston area is based on the aggregate cost of all energy produced by units dispatched on an economic basis, as well as units dispatched on a constrained on or off basis, as I previously described. The total cost of energy is allocated to all customer load within NEPOOL on a per kwh basis and is charged to all load serving entities including BECO.

Q. How would ISO-NE determine the cost associated with the planned outages needed to interconnect the Sithe Mystic generating units?

A. ISO-NE determines which units must be constrained on for the planned outages. The cost associated with running these units can be calculated by ISO-NE by multiplying (1) the additional generation needed to be dispatched due to the outage, by (2) the energy price difference between the most expensive unit dispatched under non-outage conditions, and the bid price of the units that were scheduled to run due to the planned outage. The analysis necessary to determine adjustments in system dispatch are routinely conducted by ISO-NE, and with the addition of some additional accounting, logging and checking of calculations, the process is one that can be implemented.

Q. Is this an accurate means of determining redispatch costs solely attributable to interconnection of the new Mystic generation?

A. Yes. The process I have described, when conducted with available information, leads to a differential in dispatch requirements that can be explicitly tied to the need to schedule a transmission facility out of service. The units that must be dispatched and the output of those units are derived as part of the process. The final cost of the redispatch would be based on the actual bid price differentials (between the bid price of the most expensive unit dispatched under non-outage conditions and the bid price of the units that were scheduled to run due to the planned outage) since they would be calculated after the scheduled outage is complete. The only requirement is that the information be recorded and tracked so that the necessary calculations can be performed.

Q. Under your proposal, how would you determine which redispatch costs are due to pre-existing congestion and which redispatch costs are caused by the outages necessary to interconnect the new Sithe generation at Mystic?

A. There should be no problem in segregating the redispatch costs caused by the interconnection of the new Sithe generation at Mystic from pre-existing redispatch costs because the need to run additional generation is determined after all other dispatch requirements are established. The change in dispatch would be determined by reviewing the system with all pre-outage dispatched units running and the required transmission facility outages in affect. If it is determined that additional generation is needed it would only be due to the requested transmission facility outage.

Q. Have you determined the amount of redispatch costs that will be incurred as a result of BECO's interconnection with Sithe's new Mystic generation?

A. A precise determination of the additional redispatch costs that will be incurred due to the interconnection of Sithe's new Mystic generation cannot be determined at this time because, as I mentioned, the final cost of the redispatch would be based on the actual bid-price differentials, which are calculated after the scheduled outage is complete. However, as noted in Mr. Legrow's testimony, the current estimate of redispatch costs provided by ISO-NE is between \$12 and \$30 million. These costs are also subject to the availability of existing lower cost units within the area. An unexpected loss of one of the lower cost larger units, would force the need to dispatch additional smaller and more expensive units at New Boston and Mystic stations in support of the required transmission outages, which would further increase the cost associated with the Mystic upgrades.

Q. Does this conclude your testimony?

A. Yes.

**UNITED STATES OF AMERICA**
**BEFORE THE**
**FEDERAL ENERGY REGULATORY COMMISSION**

**Boston Edison Company** ) **Docket No. ER01-890-000**

**PREPARED DIRECT TESTIMONY**
**OF**
**CHARLES P. SALAMONE**

COMMONWEALTH OF MASSACHUSETTS )
) ss
COUNTY OF NORFOLK

I, CHARLES P. SALAMONE, being first duly sworn on oath depose and say as follows:

I make this affidavit for the purpose of adopting as my sworn testimony in this proceeding the attached material entitled "Prepared Direct Testimony of Charles P. Salamone." The answers to the questions shown in said attached material and the information shown in the attached exhibits are true and correct and I adopt each answer and exhibit as my sworn testimony in this proceeding.

Further affiant saith not.

Charles P. Salamone

Subscribed and sworn to before me, a notary public in and for the Commonwealth of Massachusetts, County of Norfolk, this 13 day of April, 2001.

James R. Weaver
My Commission Expires Dec. 16, 2005

(SEAL)

JAMES R. WEAVER
COMMONWEALTH OF MASSACHUSETTS
U.S.A.
NOTARY PUBLIC

WSH49831.1

Information Request JS-NSTAR-1-5

At Page 7, Lines 5-7, Mr. Salamone testified that "Diversity factors for substations are generally lower than for individual circuits, but remain in the 92 to 98 percent range." At Page 7, Lines 21-22, Mr. Salalmone testified that "Substation diversity factors generally range from 90 percent up to 95 percent."

A. Provide appropriate definitions of "substations" that differentiate between that term as used in the quotation on Lines 5-7 versus the quotation from Line 21-22.

B. For each individual NSTAR Electric circuit, provide an Excel formatted spreadsheet showing.

1. The loads during each of the hours identified in the response to JS-NSTAR-1-4-A.
2. The individual peak demands for the same month as the identified hour.
3. The metered energy for the same month as the identified hour.
4. The individual peak demands for the same year as the identified hour.
5. The metered energy for the same year as the identified hour.
6. Calculated diversity factor.

C. For each NSTAR Electric substation, provide an Excel formatted spreadsheet showing.

1. The loads during each of the hours identified in the response to JS-NSTAR-1-4-A.
2. The individual peak demands for the same month as the identified hour.
3. The metered energy for the same month as the identified hour.
4. The individual peak demands for the same year as the identified hour.
5. The metered energy for the same year as the identified hour.

6. Calculated diversity factor.

Response

A. There is no difference in the definition of "substations" at the two identified locations. "Substations" in this context are defined as stations that provide distribution capacity and reduce voltages from transmission levels (i.e., 115 kV) to distribution levels (i.e., 23 kV, 13.8 kV or 13.2 kV).

B, C. The Company objects to responding to the request because responding to the information request would be unduly burdensome, requiring a special study to compile such information. Notwithstanding this objection, the Company has provided the following information that indicates the degree of coincidence between substations in the Boston Edison system:

Coincidence factors between the system and substations for the system are as follows:

| | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 |
|---|---|---|---|---|---|---|
| Substations Peak | 2965 | 3327 | 3230.5 | 3463.5 | 3545 | 3482.5 |
| BECo Peak | 2862 | 3070 | 3052 | 3311 | 3258 | 3131 |
| % Difference | 3.6% | 8.4% | 5.8% | 4.6% | 8.8% | 11.2% |

These values support the statement that coincidence factors for substations is generally in the range of 90 percent to 95 percent. The diversity factors are from 1998 to 2003 respectively 103.6 percent, 108.4 percent, 105.8 percent, 104.6 percent, 108.8 percent and 111.2 percent. The coincidence factors are respectively 96.4 percent, 91.6 percent, 94.2 percent, 95.4 percent, 91.2 percent and 89.8 percent.

Information Request JS-NSTAR-1-7

Mr. Salamone at Page 14 and elsewhere discusses significantly different treatment for customers over 1 MW.

A. Provide copies of all internal company memos, meeting minutes, correspondence, analysis, and work papers, including all distribution planning guidelines, that indicate different treatment for customers over 1 MW.

B. Provide the date associated with each document produced in response to A

C. Identify each customer served by NSTAR Electric with a peak demand in excess of 1 MW.

D. For each customer identified in C, provide in Excel format

1. The peak demand for that customer.
2. The date that the customer's peak demand exceeded 1 MW for the first time.
3. The size of distributed generation on the customer's site, if any.

Response

The question misinterprets Mr. Salamone's statements. The statements made by Mr. Salamone were concerning how new loads that are expected to be added to the system are treated in development of projected loads used to establish electric system capacity upgrade plans. There was no claim that customers with loads above 1 MW are treated differently in any way from all other customers as the question suggests.

Attachment JS-NSTAR-1-7 provides information that is employed in the planning process to track expected new customer loads for the electric system. The data included show the expected energy use and the projected non-coincident peak demands for new customers expected to be coming onto the system. These data are employed in developing the projected load for the NSTAR Electric system, which is then used to develop system expansion plans.

| Sector | Station Number | Total Projected Incremental Load MW (Jun 04 - Jun 07) | Annualized KWH based on Total Projected Load | Proposed In Service | Incremental Load by June 1, 2004 | Incremental Load by June 1, 2005 | Incremental Load by June 1, 2006 | Incremental Load by June 1, 2007 |
|---|---|---|---|---|---|---|---|---|
| | 4 | | | | | | | |
| Office/Retail | 4 | 30 | 50,000,000 | 3/1/04 | 30 | 0 | 0 | 0 |
| Hotel | 4 | 5 | 17,500,000 | 6/1/04 | 2 | 3 | 0 | 0 |
| Transportation | 4 | 2 | 15,000 | 1/1/03 | 2 | 0 | 0 | 0 |
| Hotel | 4 | 2 | 8,800,000 | 1/1/06 | 0 | 0 | 1 | 1 |
| Hotel/Resd & Park | 4 | 5 | 22,000,000 | 2/1/05 | 0 | 1 | 2 | 2 |
| Office/Retail | 4 | 5 | 20,000,000 | 6/1/04 | 2 | 3 | 0 | 0 |
| Office | 4 | 3 | 13,000,000 | 1/1/04 | 3 | 0 | 0 | 0 |
| Office/Residential/F | 4 | 9 | 37,000,000 | 6/1/05 | 0 | 3 | 3 | 3 |
| Residential | 4 | 5 | 18,000,000 | 6/1/06 | 0 | 0 | 2 | 3 |
| Industrial | 4 | 0 | 0 | 6/1/03 | 0 | 0 | 0 | 0 |
| Office/Residential/F | 4 | 2 | 6,000,000 | 6/1/07 | 0 | 0 | 0 | 2 |
| | 106 | | | | | | | |
| Hospital | 106 | 1.5 | 8,700,000 | 6/1/04 | 0.5 | 1 | 0 | 0 |
| Transportation | 106 | 3 | 20,000 | 7/1/04 | 3 | 0 | 0 | 0 |
| Commercial | 106 | 2.5 | 8,750,000 | 3/4/04 | 1 | 1.5 | 0 | 0 |
| Hotel | 106 | 1.5 | 5,250,000 | 1/4/05 | 0 | 1.5 | 0 | 0 |
| Transportation | 106 | 3 | 20,000 | 3/4/04 | 3 | 0 | 0 | 0 |
| Residential | 106 | 2.5 | 2,500,000 | 6/1/04 | 1 | 1.5 | 0 | 0 |
| Education | 106 | 2.5 | 3,000,000 | 6/1/04 | 1 | 1.5 | 0 | 0 |
| Commercial | 106 | 1 | 3,000,000 | 6/1/06 | 0 | 0 | 1 | 0 |
| | | | | | | | | |
| | 483 | | | | | | | |
| State | 483 | 1 | 5,000 | 3/1/04 | 1 | 0 | 0 | 0 |
| State | 483 | 2 | 10,000 | 4/1/04 | 2 | 0 | 0 | 0 |
| State | | 10 | 100,000 | 1/1/06 | 0 | 0 | 10 | 0 |
| Residential/Comme | 483 | 0 | 0 | 6/1/03 | 0 | 0 | 0 | 0 |
| | | | | | | | | |
| | | | | | | | | |
| | 2 | | | | | | | |
| Government | 2 | 3 | 15,000 | Feb-04 Ir | 1 | 1 | 1 | 0 |
| Governement/Resi | 2 | 3 | 15,000 | Jan-04 I | 1 | 1 | 1 | 0 |
| Government | 2 | 2 | 10,000 | 6/1/04 | 2 | 0 | 0 | 0 |

| Sector | Station Number | Total Projected Incremental Load MW (Jun 04 - Jun 07) | Annualized KWH based on Total Projected Load | Proposed In Service | Incremental Load by June 1, 2004 | Incremental Load by June 1, 2005 | Incremental Load by June 1, 2006 | Incremental Load by June 1, 2007 |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | | |
| | 2 | 1 | 3,500,000 | 12/1/04 | 0 | 0.5 | 0.5 | 0 |
| 2 Hotels | 2 | 1 | 3,500,000 | 6/1/04 | 0.5 | 0.5 | 0 | 0 |
| Biotech Lab | 2 | 5 | 20,000,000 | 12/1/03 | 1 | 2 | 2 | 0 |
| | | | | | | | | |
| | 12 | | | | | | | |
| Hospital | 12 | 10 | 40,000,000 | 12/1/03 | 5 | 2 | 2 | 1 |
| Hospital | 12 | -2 | -8,000,000 | 12/1/04 | 0 | -2 | 0 | 0 |
| Industrial | 12 | 2 | 8,000,000 | 10/1/05 | 0 | 0 | 2 | 0 |
| Transportation | 12 | 4 | 20,000 | 6/1/03 | 2 | 2 | 0 | 0 |
| Hotel/Office | 12 | 3 | 10,500,000 | 9/1/05 | 0 | 0 | 3 | 0 |
| Various | 12 | 0 | 0 | 6/1/03 | 0 | 0 | 0 | 0 |
| Residential Housin | 12 | 4 | 8,000,000 | 9/5/05 | 0 | 0 | 2 | 2 |
| Hotel | 12 | 1 | 1,000,000 | 1/1/05 | 0 | 1 | 0 | 0 |
| Parking | 12 | 1 | 1 | 6/1/04 | 1 | 0 | 0 | 0 |
| | | | | | | | | |
| | 53 | | | | | | | |
| Commercial | 53 | 0 | | 6/1/07 | 0 | 0 | 0 | 5 |
| | 53 | 3 | 12,000,000 | 9/1/04 | 0 | 2 | 1 | 0 |
| | | | | | | | | |
| Hotel | 53 | 3 | 10,500,000 | 3/1/04 | 1 | 1 | 1 | 0 |
| Office | 53 | 5 | 22,000,000 | 6/1/06 | 0 | 0 | 2 | 3 |
| | | | | | | | | |
| | 71 | | | | | | | |
| Hotel | 71 | 2.5 | 8,750,000 | 6/1/05 | 0 | 2.5 | 0 | 0 |
| Residential | 71 | 4 | 15,000,000 | 4/1/04 | 1 | 3 | 0 | 0 |
| | | | | | | | | |
| Hotel | 71 | 1 | 3,500,000 | 4/1/04 | 1 | 0 | 0 | 0 |
| Mixed Use Building | 71 | 2 | 7,000,000 | 10/1/03 | 2 | 0 | 0 | 0 |
| Mixed Use Building | 71 | 4 | 14,000,000 | 9/1/06 | 0 | 0 | 0 | 2 |
| | | | | | | | | |
| | 492 | | | | | | | |
| Hotel | 492 | 2.5 | 8,750,000 | 8/1/03 | 2.5 | 0 | 0 | 0 |

| Sector | Station Number | Total Projected Incremental Load MW (Jun 04 - Jun 07) | Annualized KWH based on Total Projected Load | Proposed In Service | Incremental Load by June 1, 2004 | Incremental Load by June 1, 2005 | Incremental Load by June 1, 2006 | Incremental Load by June 1, 2007 |
|---|---|---|---|---|---|---|---|---|
| Hotel | 492 | 3 | 15,000,000 | 6/1/05 | 0 | 3 | 0 | 0 |
| Office | 492 | 2 | 1,400,000 | 6/1/04 | 2 | 0 | 0 | 0 |
| Office/Light Indust | 492 | 4 | 16,000,000 | 6/1/04 | 2 | 2 | 0 | 0 |
| | 514 | | | | | | | |
| Telecommunicatior | 514 | 3 | 13,500,000 | 6/1/06 | 0 | 0 | 3 | 0 |
| Hotel | 514 | 2.5 | 11,250,000 | 6/1/04 | 1 | 1.5 | 0 | 0 |
| Office | 514 | 7 | 31,000,000 | 9/1/03 | 1 | 2 | 2 | 2 |
| Office | 514 | 5 | 22,000,000 | 2/1/04 | 1 | 2 | 2 | 0 |
| Entertainment Cen | 514 | 3 | 10,000,000 | 9/1/04 | 0 | 3 | 0 | 0 |
| Movie Thearter | 514 | 1 | 3,000,000 | 9/1/04 | 0 | 1 | 0 | 0 |
| Mixed Retail/ Resid | 514 | 3 | 13,500,000 | 1/6/05 | 0 | 3 | 0 | 0 |
| | 514 | 1 | 4,500,000 | 9/1/04 | 0 | 1 | 0 | 0 |
| Hotel | 514 | 1 | 4,500,000 | 9/1/04 | 0 | 1 | 0 | 0 |
| | 329 | | | | | | | |
| Industrial | 329 | 2 | 1,200,000 | 1/1/04 | 1 | 1 | 0 | 0 |
| Industrial | 329 | 1.5 | 900,000 | 6/1/05 | 0 | 1.5 | 0 | 0 |
| Education- Housing | 329 | 1.5 | 1,500,000 | 9/1/05 | 0 | 0 | 1.5 | 0 |
| Industrial | 329 | 0 | 0 | 3/1/03 | 0 | 0 | 0 | 0 |
| Biotech | 329 | 1 | 4,500,000 | 6/1/07 | 0 | 0 | 0 | 1 |
| Biotech | 329 | 0 | 0 | 6/1/08 | 0 | 0 | 0 | 0 |
| Industrial | 329 | 2 | 6,000,000 | 3/1/05 | 0 | 2 | 0 | 0 |
| Commercial | 329 | 5 | 15,000,000 | 6/1/07 | 0 | 0 | 0 | 5 |
| Recreational | 329 | 3 | 15,000,000 | 12/1/03 | 1.5 | 1.5 | 0 | 0 |
| Church | 329 | 0.5 | 2,250,000 | 6/1/05 | -2 | 2.5 | 0 | 0 |
| Biotech | 329 | 4 | 18,000,000 | 6/1/06 | 0 | 0 | 4 | 0 |
| Hospital & Reasear | 329 | 10 | 45,000,000 | 6/1/06 | 0 | 0 | 5 | 5 |
| Educational | 329 | 2.5 | 7,500,000 | 1/1/07 | 0 | 0 | 0 | 2.5 |
| Commercial | 329 | 2 | 8,000,000 | 7/1/03 | 2 | 0 | 0 | 0 |
| Educational | 329 | 4 | 4,000,000 | 2/1/05 | 0 | 2 | 2 | 0 |
| | | | | | | | | |
| Industrial | 329 | 5 | 25,000,000 | 1/1/05 | 0 | 5 | 0 | 0 |
| Industrial | 329 | 5 | 25,000,000 | 1/1/06 | 0 | 0 | 5 | 0 |
| | | | | | | | | |

| Sector | Station Number | Total Projected Incremental Load MW (Jun 04 - Jun 07) | Annualized KWH based on Total Projected Load | Proposed In Service | Incremental Load by June 1, 2004 | Incremental Load by June 1, 2005 | Incremental Load by June 1, 2006 | Incremental Load by June 1, 2007 |
|---|---|---|---|---|---|---|---|---|
| Educational | 329 | 2 | 2,000,000 | 9/1/04 | | 1.25 | 0.75 | 0 |
| Hospital | | 10 | 40,000,000 | 6/1/05 | 0 | 10 | 0 | 0 |
| | | | | | | | | |
| R&D Facility | 329 | 1 | 1,000,000 | 6/1/04 | 1 | 0 | 0 | 0 |
| R&D Facility | 329 | 6 | 0 | 6/1/05 | 0 | 0 | 0 | 0 |
| | | | | | | | | |
| | 496 | | | | | | | |
| | | | | | | | | |
| Government | 496 | 3.5 | 20,000 | 1/1/04 | 3.5 | 0 | 0 | 0 |
| | | | | | | | | |
| | | | | | | | | |
| Industrial | 496 | 8 | 48,000,000 | 6/1/04 | 2 | 2 | 2 | 2 |
| Industrial | 496 | 9 | 54,000,000 | 4/1/04 | 1 | 3 | 5 | 0 |
| Industrial | 496 | -3.5 | -17,500,000 | 6/1/04 | -3.5 | 0 | 0 | 0 |
| | | | | | | | | |
| | | | | | | | | |
| School | 496 | 1.5 | 3,600,000 | 9/1/04 | 1.5 | 0 | 0 | 0 |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | 342 | | | | | | | |
| School | 342 | 1 | 2,400,000 | 9/1/04 | 0 | 1 | 0 | 0 |
| | | | | | | | | |
| | 240 | | | | | | | |
| Industrial | 240 | 3 | 22,140,000 | 7/1/03 | 1 | 1 | 1 | 0 |
| | | | | | | | | |
| | | | | | | | | |
| School | 240 | 2 | 4,800,000 | 9/1/04 | 0 | 2 | 0 | 0 |
| Industrial | 240 | 1.5 | 0 | 3/1/03 | 1.5 | 0 | 0 | 0 |
| Industrial | | 1 | 700,000 | 4/1/04 | 1 | 0 | 0 | 0 |
| | | | | | | | | |
| Industrial | | 1.4 | 1,650,000 | 1/1/04 | 0.35 | 0.35 | 0.35 | 0.35 |
| | | | | | | | | |

| Sector | Station Number | Total Projected Incremental Load MW (Jun 04 - Jun 07) | Annualized KWH based on Total Projected Load | Proposed In Service | Incremental Load by June 1, 2004 | Incremental Load by June 1, 2005 | Incremental Load by June 1, 2006 | Incremental Load by June 1, 2007 |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | | |
| | 126 | | | | | | | |
| Industrial | 126 | 0 | 0 | 7/1/03 | 0 | 0 | 0 | 0 |
| Industrial | 126 | 2.5 | 5,160,000 | 6/1/04 | 2.5 | 0 | 0 | 0 |
| Industrial | 126 | 1 | 6,000,000 | 6/1/05 | 0 | 1 | 0 | 0 |
| Industrial | 126 | 4 | 24,000,000 | 6/1/05 | 0 | 4 | 0 | 0 |
| | | | | | | | | |
| | 470 | | | | | | | |
| | 470 | | | | | | | |
| | | | | | | | | |
| Office/Industrial | 470 | 1 | 5,000,000 | 10/1/06 | 0 | 0 | 0 | 1 |
| | | | | | | | | |
| Educational | 470 | 1 | 2,300,000 | Sept-04 | 0 | 1 | 0 | 0 |
| | | | | | | | | |
| | | | | | | | | |
| | 148 | | | | | | | |
| Government | 148 | 4 | 9,600,000 | 6/1/04 | 2 | 1 | 1 | 0 |
| Educational | 148 | 1 | 2,400,000 | 9/7/04 | 0 | 0 | 0 | 1 |
| | | | | | | | | |
| | 375 | | | | | | | |
| Industrial | 375 | 0 | 0 | 4/1/03 | 0 | 0 | 0 | 0 |
| Industrial | 375 | 1 | 6,000,000 | 6/1/04 | -1.5 | 2.5 | 0 | 0 |
| Educational | 375 | 1 | 2,400,000 | 9/5/04 | 0 | 1 | 0 | 0 |
| | | | | | | | | |
| | 391 | | | | | | | |
| Industrial | 391 | 0.5 | 3,000,000 | 12/1/03 | -1 | 1.5 | 0 | 0 |
| Industrial | 391 | 4.5 | 46,750,000 | 1/1/07 | 0 | 0 | 0 | 4.5 |
| Industrial | 391 | -1 | -6,000,000 | 1/1/05 | -1 | 0 | 0 | 0 |
| | | | | | | | | |
| | 450 | | | | | | | |
| Industrial | 450 | 3.5 | 34,000,000 | 1/1/07 | 0 | 0 | 0 | 3.5 |
| Office | 450 | 3.5 | 15,750,000 | 1/1/06 | 0 | 0 | 1 | 2.5 |
| Education | 450 | 4 | 45,000,000 | 6/1/05 | | 1 | 1 | 2 |

| Sector | Station Number | Total Projected Incremental Load MW (Jun 04 - Jun 07) | Annualized KWH based on Total Projected Load | Proposed In Service | Incremental Load by June 1, 2004 | Incremental Load by June 1, 2005 | Incremental Load by June 1, 2006 | Incremental Load by June 1, 2007 |
|---|---|---|---|---|---|---|---|---|
| Office | 450 | 1 | 1,000,000 | 11/1/03 | 1 | 0 | 0 | 0 |
| | | | | | | | | |
| | 488 | | | | | | | |
| | | | | | | | | |
| Airport | 488 | 3.6 | 28,000,000 | 6/1/04 | 1 | 2.6 | 0 | 0 |
| Airport | 488 | 2.5 | 19,500,000 | 6/1/04 | 2.5 | 0 | 0 | 0 |
| Airport | 488 | 2.5 | 19,500,000 | 6/1/05 | 0 | 2.5 | 0 | 0 |
| Hotel | 488 | 0 | 0 | 9/1/02 | 0 | 0 | 0 | 0 |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| Industrial | | 1 | 4,500,000 | 9/1/03 | 1 | 0 | 0 | 0 |
| Industrial | 533 | -2 | 12,000,000 | 7/5/04 | -2 | | | |
| | 320 | | | | | | | |
| Medical Manufactu | 320 | 1.3 | 7,800,000 | 6/1/03 | 1.3 | 0 | 0 | 0 |
| Industrial | 320 | -1.5 | -7,000,000 | 9/1/03 | -1.5 | 0 | 0 | 0 |
| Industrial | 320 | 0 | 0 | 6/3/03 | 0 | 0 | 0 | 0 |
| | 402 | | | 6/1/03 | 0 | | | |
| Transportation | 402 | 3 | 15,000 | 6/1/04 | 3 | 0 | 0 | 0 |
| Commercial | 402 | 1.2 | 4,800,000 | 1/1/04 | 1.2 | 0 | 0 | 0 |
| | | | | | | | | |
| | 292 | | | | | | | |
| School | 292 | 0.7 | 1,680,000 | 9/1/04 | 0 | 0.7 | 0 | 0 |
| Commercial/retail | 292 | 0.7 | 3,000,000 | 9/1/05 | 0 | 0 | 0.7 | 0 |
| | | | | | | | | |
| | | | | | | | | |
| | 467 | | | | | | | |
| Commercial | 467 | -1.5 | -7,500,000 | 6/1/04 | -1.5 | 0 | 0 | 0 |
| | | | | | | | | |
| | | | | | | | | |
| Educational | | 0.5 | 1,200,000 | 9/1/04 | 0 | 0.5 | 0 | 0 |
| | | | | | | | | |
| | | | | | | | | |

| Sector | Station Number | Total Projected Incremental Load MW (Jun 04 - Jun 07) | Annualized KWH based on Total Projected Load | Proposed In Service | Incremental Load by June 1, 2004 | Incremental Load by June 1, 2005 | Incremental Load by June 1, 2006 | Incremental Load by June 1, 2007 |
|---|---|---|---|---|---|---|---|---|
| | 800 | | | | | | | |
| Industrial | 800 | 4.5 | 27,000,000 | 8/1/02 | 1.5 | 4 | 0 | 0 |
| " | 800 | 3.4 | 20,400,000 | 6/1/04 | 1 | 2.4 | 0 | 0 |
| " | 800 | 3 | 18,000,000 | 6/1/05 | 0 | 1 | 2 | 0 |
| " | 800 | 3.5 | 21,000,000 | 8/1/03 | 1 | 2.5 | 0 | 0 |
| " | 800 | 1.5 | 9,000,000 | 6/1/05 | 0 | 0.5 | 1 | 0 |
| | | | | | | | | |
| Commercial | 800 | 1 | 3,500,000 | 6/1/04 | 1 | 0 | 0 | 0 |
| Commercial | 800 | 2 | 9,000,000 | 6/1/04 | 2 | 0 | 0 | 0 |
| Commercial/Resid. | 800 | 4 | 18,000,000 | 1/1/06 | 0 | 0 | 2 | 2 |
| Biotech | 800 | 1.5 | 6,000,000 | 12/1/04 | 0 | 1.5 | 0 | 0 |
| Biotech | 800 | 5 | 30,000,000 | 9/1/03 | 1 | 2 | 2 | 0 |
| Commercial | 800 | 6 | 36,000,000 | 6/1/03 | 2 | 2 | 2 | 0 |
| Commercial | 800 | 6 | 27,000,000 | 6/1/04 | 2 | 2 | 2 | 0 |
| Residential | 800 | 3 | 13,500,000 | 1/1/05 | 0 | 1 | 1 | 1 |
| | | | | | | | | |
| | 831 | | | | | | | |
| Commercial | 831 | 1.5 | 6,000,000 | 10/4/04 | 0 | 1 | 0.5 | |
| Residential | 831 | 1.8 | 7,200,000 | 1/1/05 | 0 | 1 | 0.8 | 0 |
| Commercial | 831 | 0 | | 8/1/02 | 0 | 0 | 0 | 0 |
| Educational/Resea | 831 | 5.1 | 30,600,000 | 8/1/03 | 1.7 | 0 | 3.4 | 0 |
| University/Resid | 831 | 12 | 60,000,000 | 1/1/04 | 3 | 3 | 3 | 3 |
| | | | | | | | | |
| | 828 | | | | | | | |
| Research / Chiller I | 828 | 10 (load will eventu | 100,000,000 | 1/1/06 | 0 | 0 | 5 | 5 |
| Bio-Tech/Lght man | ? | 1.7 | 10,200,000 | 5/15/02 | 0 | 1.2 | 0.5 | 0 |
| Nursing Home | 828 | 1 | 3,000,000 | 8/1/03 | 0.5 | 0.5 | 0 | 0 |